

The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* JES ASMUSSEN and WEN SHIN HUANG

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Appeal 2006-2992  
Application 10/073,710  
Technology Center 1700

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Decided: January 30, 2007

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Before EDWARD C. KIMLIN, THOMAS A. WALTZ, and  
CATHERINE Q. TIMM, *Administrative Patent Judges*.

WALTZ, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on an appeal from the Primary Examiner's final rejection of claims 1 through 5 and 8 through 19, which are the only claims pending in this application. We have jurisdiction pursuant to 35 U.S.C. § 134.

According to Appellants, the invention is directed to a process for depositing a nanocrystalline diamond film with a grain size between 1 and

100 nanometers (nm) on a surface of a substrate (Br. 3). A copy of illustrative independent claim 1 may be found in the “Claims Appendix” attached to Appellants’ Brief.

The Examiner has relied upon the following references as evidence of obviousness:

Asmussen (Asmussen ‘668)	US 4,585,668	Apr. 29, 1986
Asmussen (Asmussen ‘293)	US 4,727,293	Feb. 23, 1988
Asmussen (Asmussen ‘900)	US 4,906,900	Mar. 06, 1990
Herb	US 5,273,790	Dec. 28, 1993
Asmussen (Asmussen ‘103)	US 5,311,103	May 10, 1994
Gruen	US 6,592,839 B2	Jul. 15, 2003

#### ISSUES ON APPEAL

Claims 1-5, 8-12, 14-17, and 19 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Gruen in view of Asmussen ‘103, Asmussen ‘668, Asmussen ‘900, or Asmussen ‘293 (Answer 3-8).<sup>1</sup> Claims 13 and 18 stand rejected under § 103(a) over the references listed above further in view of Herb (Answer 4, 5, 6, and 7).

Claims 1-5, 8-12, 14-17, and 19 stand rejected under the judicially created doctrine of obviousness-type double patenting as unpatentable over claims 1, 2, and 4 of Asmussen ‘668 in view of Gruen (Answer 8) or claims 22-27 of Asmussen ‘668 in view of Gruen (Answer 9).

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<sup>1</sup> For purposes of judicial economy, we have grouped the Examiner’s separate rejections since each rejection involves the same claims, the same primary reference (Gruen), and a secondary reference to Asmussen (either ‘103, ‘668, ‘900, or ‘293). *See* the Answer 3, 4, 6, and 7. Similarly, we have grouped the rejections of claims 13 and 18 over the references as listed above further in view of Herb (Answer 4, 5, 6, and 7).

Appellants contend that Gruen is silent regarding the exclusion of oxygen and nitrogen from the gas mixture and no reference teaches using less than 10 ppm of oxygen or nitrogen in the process (Br. 9-10).

Appellants also contend that Gruen positively teaches that nitrogen can be used as an alternative “inert gas” in place of argon, thus showing that Appellants have proceeded contrary to accepted wisdom (Br. 11).

Appellants contend that the Asmussen references fail to disclose that their apparatus is “essentially free of leaks” as required by claim 1 on appeal (Br. 13-14).

The Examiner contends that Gruen discloses gases used in the claimed process which do not contain nitrogen or oxygen, while also teaching the exclusion of oxygen (Answer 3 and 9). The Examiner also contends that the apparatus of the Asmussen references is not taught as having leaks (Answer 10).

The issues in this appeal are as follows:

- (1) does Gruen disclose, teach or suggest that the gases generating the plasma are “essentially free from oxygen or nitrogen” as required by claim 1 on appeal?; and
- (2) do the Asmussen references teach the use of an apparatus that is “essentially free from leaks of nitrogen or oxygen” as required by claim 1 on appeal?

We answer these questions in the affirmative. We determine that the Examiner has established a prima facie case of obviousness in view of the reference evidence, which prima facie case has not been persuasively rebutted by Appellants’ arguments and evidence. Therefore we AFFIRM all rejections on appeal essentially for the reasons stated in the Answer with the

exception of the rejection for obviousness-type double patenting over claims 22-27 of Asmussen '668 in view of Gruen (Answer 9). We REVERSE this ground of rejection for reasons stated below.

## OPINION

### THE REJECTIONS BASED ON § 103(a)

Since the Asmussen references are cumulative at best, we will limit our discussion to Asmussen '103, as Appellants' principal arguments are also limited to this reference (Br. 9-14).<sup>2</sup> We also note that Appellants only present arguments with regard to claim 1 on appeal when discussing the combination of Gruen and Asmussen '103, and thus we will also limit our discussion to this claim.

The Examiner finds, and Appellants do not dispute, the following facts:

- (1) Gruen discloses a method of forming a nanocrystalline diamond film by plasma chemical vapor deposition (CVD), where the plasma is formed by radiofrequency and/or microwave using argon as the only inert gas in admixture with hydrogen and an unsubstituted hydrocarbon (Answer 3 and 9);
- (2) Gruen does not disclose that the plasma CVD process is performed in an apparatus as required by claim 1 on appeal (Answer 3);
- (3) Ausmussen '103 discloses an apparatus for depositing diamond films on silicon substrates, where this apparatus is

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<sup>2</sup> We also note that Figure 1 disclosed by Asmussen '103 is identical to Figure 1 of this application.

the same as required by claim 1 on appeal, and has the benefits of being economical to construct, reliable to use, and produces excellent results (Answer 3-4).

Implicit in our review of the Examiner's obviousness analysis is that the claim must first have been correctly construed to define the scope and meaning of each contested limitation. *See Gechter v. Davidson*, 116 F.3d 1454, 1457, 1460 n.3, 43 USPQ2d 1030, 1032, 1035 n.3 (Fed. Cir. 1997). During examination proceedings, claims are given their broadest reasonable interpretation consistent with the specification. *See In re Graves*, 69 F.3d 1147, 1152, 36 USPQ2d 1697, 1701 (Fed. Cir. 1995); *In re Morris*, 127 F.3d 1048, 1054, 44 USPQ2d 1023, 1027 (Fed. Cir. 1997). It is well-established that before a conclusion of obviousness can be made based on a combination of references, it is incumbent upon the Examiner to identify some suggestion, reason, or motivation to lead an inventor to combine these references. *See In re Mayne*, 104 F.3d 1339, 1342, 41 USPQ2d 1451, 1454 (Fed. Cir. 1997).

Accordingly, we must first construe the disputed terms "essentially free from oxygen or nitrogen" and "essentially free from leaks of nitrogen or oxygen" as found in clause (c) of claim 1 on appeal. According to Appellants' Specification (6:10-16), "preferably there is less than about 10 ppm of combined oxygen and nitrogen" in the chamber, and the chamber is "made as leak-free as possible" to prevent oxygen or nitrogen from entering the chamber. Appellants further teach that an "[u]ltra-low leak rate of 4mTorr/hr ensured negligible introduction of nitrogen from the atmosphere." Specification 24:18-19. However, we cannot limit the scope of these disputed terms by the "preferred" embodiments absent an express disclaimer

by Appellants of a broader definition. *See In re Bigio*, 381 F.3d 1320, 1325, 72 USPQ2d 1209, 1210-11 (Fed. Cir. 2004). Since Appellants present data from a process and apparatus where as much as 2500 ppm of nitrogen is present, with similar results over the range of 5 to 2500 ppm nitrogen (Figures 11 and 11A; Specification 23:18-21), we determine that “essentially free of nitrogen or oxygen” may include up to 2500 ppm of either gas, and the term “essentially free of leaks” include any apparatus where leaks of nitrogen or oxygen do not cause the plasma gas to go over this 2500 ppm limit for each gas.

Since Appellants disclose that the “basic description of the preferred microwave plasma deposition apparatus employed in the present invention is set forth in U.S. Patent No. 5,311,103 [Asmussen]” (Specification, sentence bridging pages 9-10; *see also* Specification 11:5-8), we determine that the apparatus of Asmussen ‘103 must meet the limitation of claim 1 that it is “essentially free from leaks of nitrogen or oxygen.”

We determine that the Examiner has established a reasonable belief that the process of Gruen does not include any oxygen or nitrogen for the following reasons. First, the Examiner finds that Gruen employs a plasma gas consisting of only three elements, namely argon, hydrogen, and methane in amounts totaling 100% (Answer 9, citing Table 1 of Gruen). Second, the Examiner finds that Gruen teaches excluding oxygen from the hydrocarbon element of the plasma gas (col. 4, ll. 16-20), therefore suggesting to one of ordinary skill in this art that added oxygen would have been deleterious to the plasma (Answer 3 and 9). Therefore, we determine the burden of proof has shifted to Appellants. We note that Appellants have not established by evidence or technical reasoning that the process of Gruen would have

included amounts of oxygen or nitrogen outside the scope of the claims on appeal.

Appellants argue that evidence in their Specification discloses results which were not shown or suggested by the prior art references (Br. 13). Therefore, we begin anew and consider the evidence of non-obviousness against the evidence of obviousness. *See In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).

We do not find Appellants' evidence persuasive of non-obviousness for the following reasons. Appellants refer to Figures 7A-7F and 11-11A as establishing a growth rate increase without substantial increase in surface roughness for trace levels of nitrogen (Br. 12-13). However, the burden is on Appellants to establish that these results were truly unexpected, commensurate in scope with the claimed subject matter, and involved comparisons with the closest prior art. *See In re Klosak*, 455 F.2d 1077, 1080, 173 USPQ 14, 16 (CCPA 1972); *Ex parte Gelles*, 22 USPQ2d 1318, 1319 (Bd. Pat. App. & Int. 1992). We determine that Appellants have not met this burden. Appellants have not established that the results, which vary in only a small range, would have been considered unexpected by one of ordinary skill in this art. Furthermore, the results are under one set of specific conditions while claim 1 on appeal is not so limited. We note that claim 1 may be "essentially free" of oxygen or nitrogen, while the results are exclusive to nitrogen levels.

The Examiner has additionally applied Herb against claims 13 and 18 to show the benefits of using molybdenum as a substrate holder in a plasma CVD process (e.g., Answer 4). Appellants admit that Herb teaches that molybdenum is known as a substrate holder but argues that Herb is not

directed to the process of claim 1 (Br. 14). Appellants' argument is not persuasive since the teachings of Herb would have been recognized as applicable to the similar plasma CVD process of Gruen by one of ordinary skill in this art.

The Examiner has identified a clear motivation or suggestion to combine the references to Gruen and Asmussen (Answer 3-4). We note that Appellants do not dispute the Examiner's identified motivation or suggestion for combining the references (see the Brief in its entirety).

For the foregoing reasons and those stated in the Answer, we determine that the Examiner has established a prima facie case of obviousness in view of the reference evidence. Based on the totality of the record, including due consideration of Appellants' arguments and evidence, we determine that the preponderance of evidence weighs most heavily in favor of obviousness within the meaning of § 103(a). Therefore, we affirm all rejections on appeal based upon § 103(a).

#### THE REJECTIONS FOR OBVIOUSNESS-TYPE DOUBLE PATENTING

Appellants do not contest the Examiner's rejections for obviousness-type double patenting other than to vaguely argue that the claimed invention is "not disclosed or suggested or claimed in these references" (Br. 18; *see* the Answer 11). Accordingly, we summarily affirm the rejection of claims 1-5, 8-12, 14-17, and 19 under the judicially created doctrine of obviousness-type double patenting over claims 1, 2, and 4 of Asmussen '668 in view of Gruen, adopting the Examiner's factual findings and conclusion of law as set forth on page 8 of the Answer.



We cannot sustain the second obviousness-type rejection as set forth on page 9 of the Answer. The Examiner bases this rejection on claims 22-27 of Asmussen '668 but we do not find these claims in the reference. We find only claims 1-16 in Asmussen '668. Therefore, we reverse this ground of rejection.

#### SUMMARY

We affirm the rejection of claims 1-5, 8-12, 14-17, and 19 under 35 U.S.C. § 103(a) over Gruen in view of Asmussen '103, Asmussen '668, Asmussen '293, or Asmussen '900. We affirm the rejection of claims 13 and 18 under 35 U.S.C. § 103(a) over the references listed above further in view of Herb.

We affirm the rejection of claims 1-5, 8-12, 14-17, and 19 under the judicially created doctrine of obviousness-type double patenting over claims 1, 2, and 4 of Asmussen '668 in view of Gruen. We reverse the rejection of claims 1-5, 8-12, 14-17, and 19 under the judicially created doctrine of obviousness-type double patenting over claims 22-27 of Asmussen '668 in view of Gruen.

The decision of the Examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv)(2007).

AFFIRMED

Appeal 2006-2992  
Application 10/073,710

sld /clj

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